CPU-2616

PCI-104 CPU Card

User's Manual

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1. Introducing the CPU2616 System

1.1 Overview

The CPU2616 is an AMD Geode™ LX-800 Low power processor, all in one, PCI-104 CPU board. This user's manual provides information on the physical features, installation, and BIOS setup of the CPU2616.

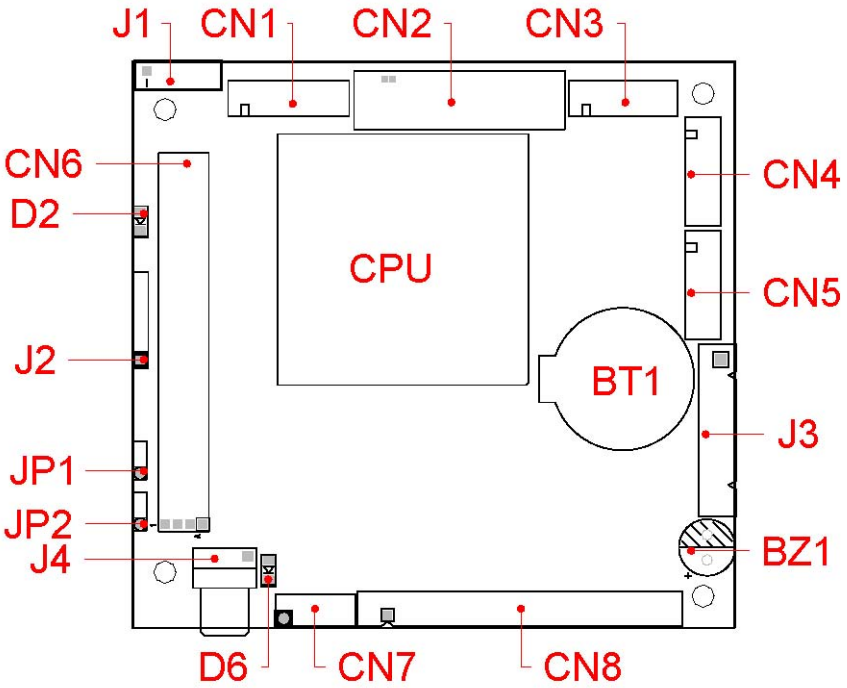
Built to unleash the total potential of the AMD Geode™ Processor, the CPU2616 is a single board computer capable of handling today's demanding requirements. Able to support 500 MHz CPU, this unit supports 10/100M interface network port, audio, 1 DIMM socket supports up to 1GB DDR RAM, two USB2.0 ports, and a VGA controller.

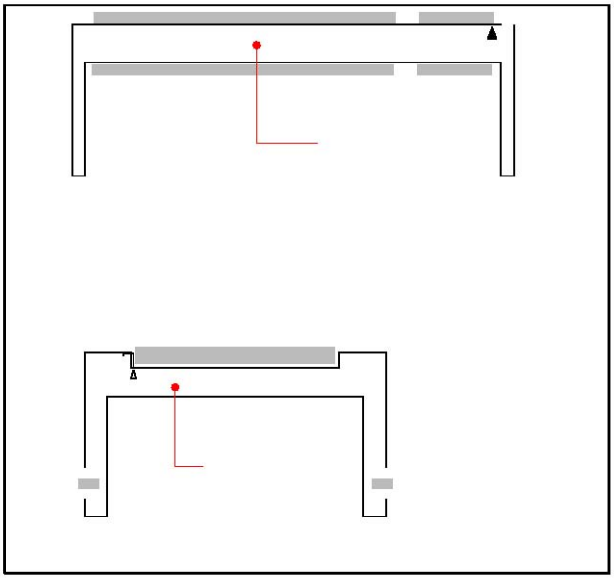
Each CPU2616 has two ports for I/O communications. Two RS-232 ports are available. There is also a watchdog timer that can be configured from software to automatically reset the system. And for easy configuration, Phoenix-Award BIOS are available.

Power management is also featured to lower the rate of consumption. The unit supports doze mode, <Suspend Mode> and <Standby mode> as well as it adheres to the "Green Function" standard.

The CPU2616 is perfect for POS and POI applications, network systems, panel / MMI's, order entry kiosks, test equipment, OEM projects or as a motherboard for a panel PC. The unit is only 90.2x95.9mm, offering unparalleled performance in a very small footprint.

1.2 Layout


J1
CN1
CN2
CN3
CN6
CN4
D2
CPU
CN5
BT1
J2
J3
JP1
JP2
J4
BZ1
D6
CN7
CN8



1.3 Specifications

1. AMD Geode™ LX800 (500MHz) Low Power CPU.
2. AMD Geode CS5536 chipset and 64KB or above L2 cache inside the CPUs.
3. Supporting One 200 pin So-DIMM socket for up to 1GB DDR-333/400 RAM.
4. One 100M/10M Ethernet port.
5. Supports CRT port and LCD interface up to 254MB shared memory.
6. Two RS-232 ports, two USB ports, and One PCI IDE interface.
7. Compact Flash socket for 3.3V Compact Flash and Micro Drives.
8. PS/2 compatible keyboard and mouse interface.
9. Providing speaker and hard disk access LED.
10. Software programmable watchdog timer.
11. Providing one AC97 audio function.
12. Flash BIOS with easy upgrade utility.
13. PCI-104 form factor, 90.2 mm x 95.9 mm (3.55" x 3.775")
14. Power requirement: +5V only, 1.3A maximum. (500MHz CPU)

1.4 Packing List

Upon receiving the package, verify the following things. Should any of the mentioned happens, contact us for immediate service.

• Unpack and inspect the CPU2616 package for possible damage that may occur during the delivery process.

• Verify the accessories in the package according to the packing list and see if there is anything missing or incorrect package is included.

• If the cable(s) you use to install the CPU2616 is not supplied from us, please make sure the specification of the cable(s) is compatible with the CPU2616 system.

Note: After CPU2616 is installed, it is recommended that you keep the diskette or CD that contains drivers and document files, and keep the document copies, or unused cables in the carton for future use.

The following lists the accessories that may be included in your CPU2616 package. Some of the accessories are optional shipped only upon order.

- One CPU2616 All-In-One PCI-104 CPU board
- One VGA (CRT interface) adapter cable
- One 44-pin hard disk drive interface cable
- Two serial ports and one parallel port interface cable
- One PS2 keyboard and mouse port adapter cable
- One 10-pin LAN adapter cable with FB4605A board.
- One USB cable, one Audio cable, and one FB4641X Audio/USB adapter board.(All are Optional items)
- One compact disc containing manual file in PDF format and necessary drivers and utilities

2. Hardware Installation

This chapter introduces the system connectors & jumper settings, and guides you to apply them for field application.

2.1 Before Installation

Before you install the system, make sure you follow the following descriptions.

1. Before removing the board from its anti-static bag, wear an anti-static strap to prevent the generation of Electricity Static Discharge (ESD). The ESD may be generated by man's physical touch. It may do damage to the board circuit.

2. Install any connector, module, or add-on card, be sure that the power is disconnected from the system board. If not, this may damage the system board components, module, or the add-on-card.

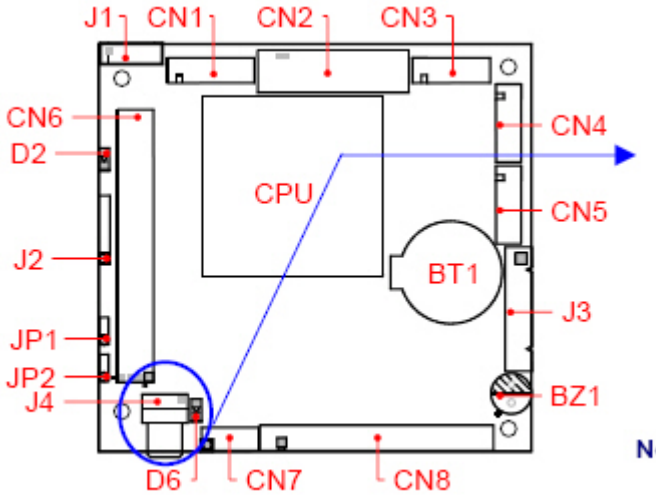
3. When you connect the connectors and memory modules, be careful with the pin orientations.

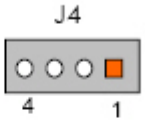
2.2 Hardware Features

The following list is for the setup of the connectors and jumpers of the CPU2616.

Item	Description
CN1	AMR connector for provides AC97 signals for Audio function (IDC)
CN2	40-pin LCD Connector with 24 bit LCD signals (DF13)
CN3	10-pin 2.0mm CRT connector (IDC)
CN4 ,CN5	10-pin 2.0mm RS-232 port connector (IDC)
CN6	PCI-104
CN7	10-pin USB connector header
CN8	44-pin 2.0mm IDE 2 hard disk connector (IDC)
CN9,JP1	Compact Flash Socket and Master/Slave Select
J1	5-pin for Keyboard and Mouse 2.0mm connector (JST)
J2	6-pin Power and watchdog of LED indicator header and Reset header
J3	10-pin for RJ45-Lan 2.54mm connector r (JST)
J4	4-pin Power 2.5mm connector
BZ1	On board Buzzer
JP2	3-pin Battery Select /Clean CMOS jumper
DIMM1	DDR So-DIMM Socket 200-pin

2.2.1 J4: Power Connector (4-pin 2.5mm JST)





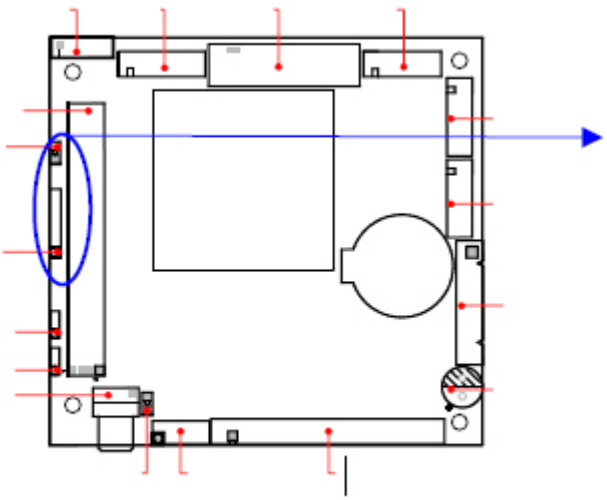
PIN	Signal
1	VDD (+5V)
2	Ground
3	Ground
4	VCC (+12V)

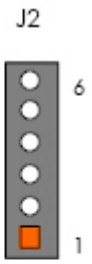
Note: FB2616 needs +5V only, +12V is not necessary.

Note: Be careful with the pin orientation when installing power connector. A wrong connection can easily destroy your CPU2616 board.

2.2.2 J2: External Power/HDD LED's Indicators & Reset Header

The Power and HDD LED's has two distinctive statuses: Off for inactive operation and blinking light for activity, and the J2 3, 4 pin (LED1+/LED1-) for Power and 5,6 pin for HDD. And 1, 2 pin header for connecting to system reset button. Shorting the circuit of the 2 pins makes the hardware reset and CPU2616 restart system. It is similar to power off the system and then power it on again.

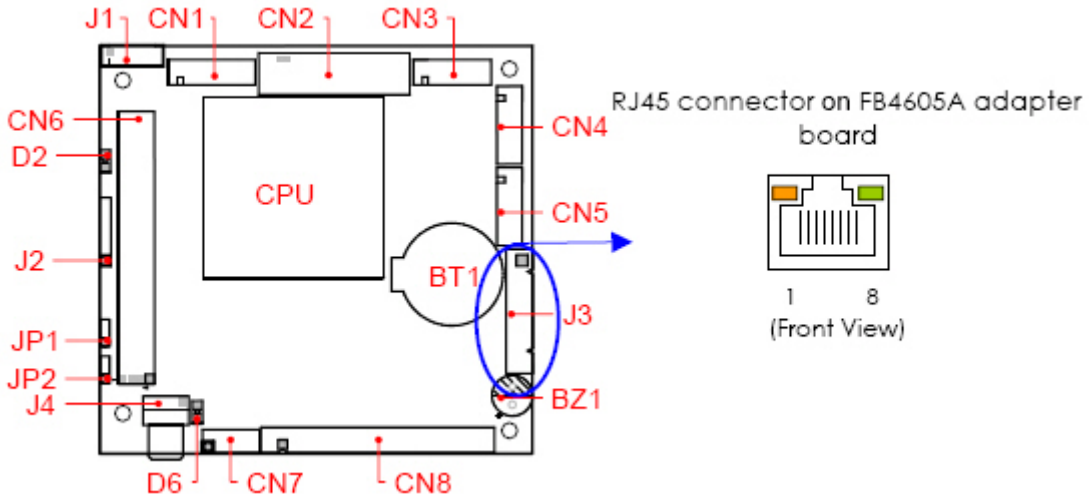




PIN	Signal
1	Reset +
2	Reset -
3	P/W LED +
4	P/W LED -
5	HDD LED+
6	HDD LED -

2.2.3 J3: RJ45 LAN /Adapter Connector with LED indicators

FB4605A is a RJ45 connector with 2 LEDs for LAN. The left side LED (orange) indicates data which is being accessed and the right side LED (green) indicates on-line status. (On indicates on-line and off indicates off-line) J3 provides twist-pair signals of LAN port if you got LAN version and adapter board (FB4605A) with cable. The following lists the pin assignments of J1 to RJ45 connector on the FB4605A LAN adapter board:

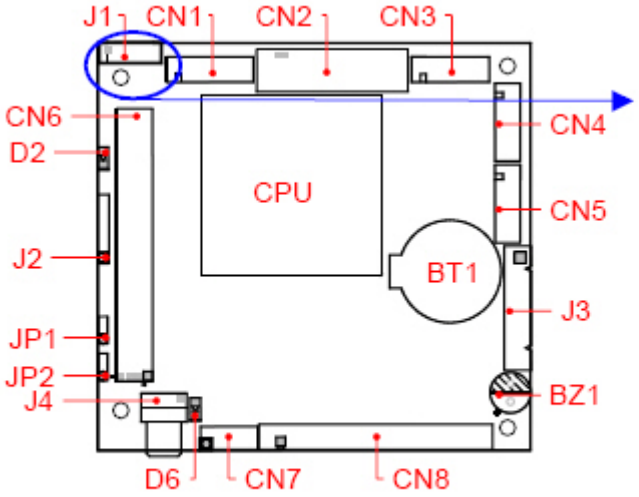


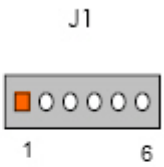
The following list the pin assign8ments of J3.

TPin	Signal	RJ45	Pi7n	Signal	RJ45
1	TPTX+	1	6	Access LED	-
2	TPTX-	2	7	On-Line LED	-
3	TPRX+	3	8	Case GND	-
4	TPRX-	6	9	FBG1	4
5	LED Common	-		FBG1	5
			10	FBG2	7
				FBG2	8

2.2.4 J1: Keyboard/Mouse Connector

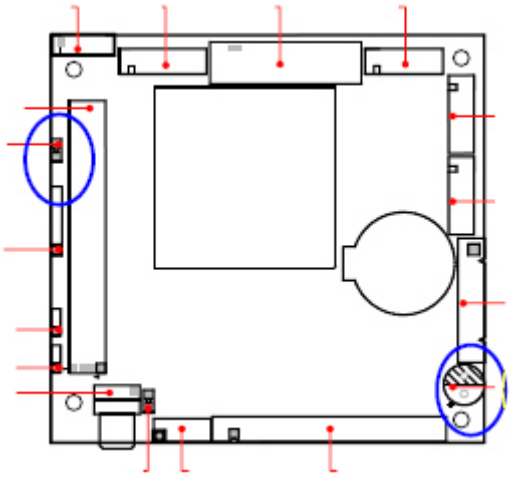
J1 is a 6-pin 2.0mm JST connector, use the included KB/MS adapter cables you can attach standard PS/2 type keyboard and mouse.





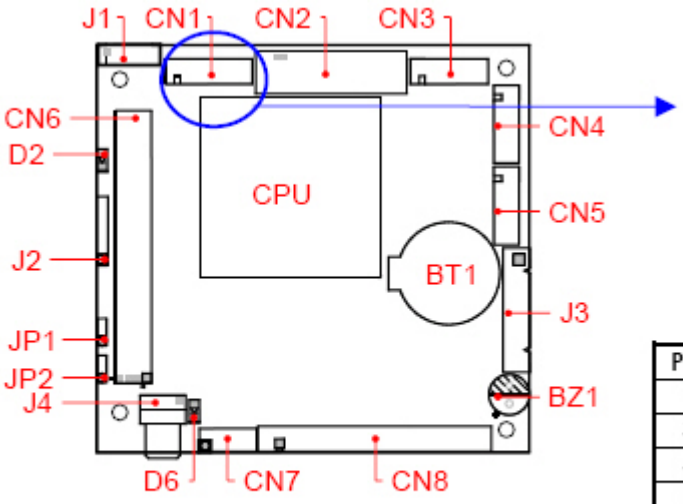
PIN	Signal
1	Mouse Data
2	Keyboard Data
3	Ground
4	VCC
5	Mouse Clock
6	Keyboard Clock

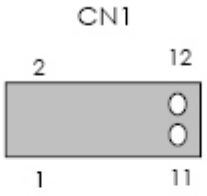
2.2.5 BZ1 & D2: Onboard Buzzer /Power LED



2.2.6 CN1: Audio Connector

CN1 is a 12-pin 2.0mm IDC connector with AC97 signals for Audio I/O. Use the included Audio cable and FB4641x adapter board for your Audio applications.

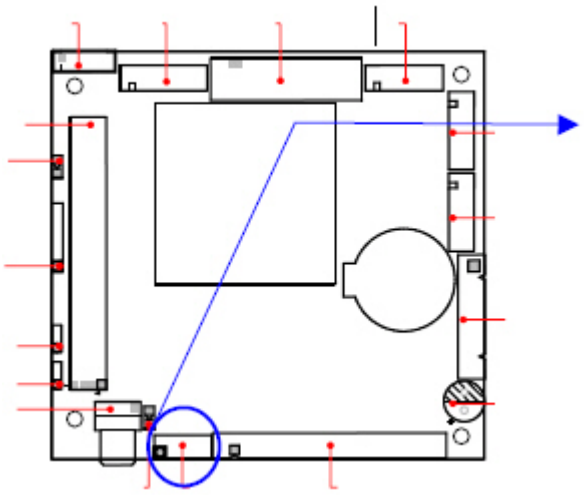


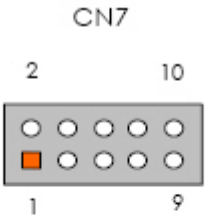


PIN	Description	PIN	Description
1	BITCLK	2	N.C
3	+5V	4	SYNC
5	Ground	6	Ground
7	+3.3V	8	ACRST#
9	SDOUT	10	SPKR
11	SDIN	12	SDIN2

2.2.7 CN7: USB Connector

Use the USB adapter cable and FB4641 board, you can attach up to 2 USB devices.

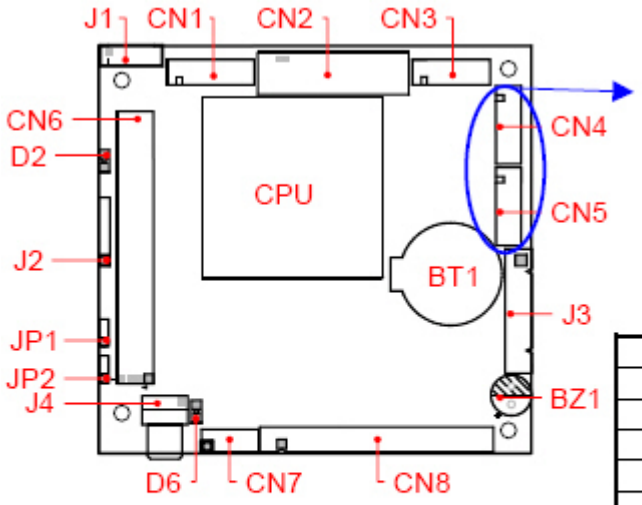


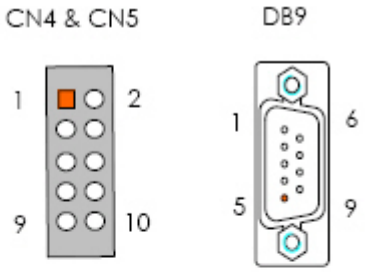


PIN	Description	PIN	Description
1	USBV0	2	Case Ground
3	USBD0-	4	USBG1
5	USBD0+	6	USBD1+
7	USBG0	8	USBD1-
9	Case Ground	10	USBV1

2.2.8 CN4 & CN5: Serial Port Connectors RS-232C Pin Definitions

CN4 (COM1) & CN5 (COM2) are 10-pin 2.0mm IDC connectors. The included serial port adapter cables are used to transfer 10-pin 2.0mm IDC into standard DB-9 connector. The following tables show the signal connections of these connectors and the included adapter cable for CN5 & CN6:

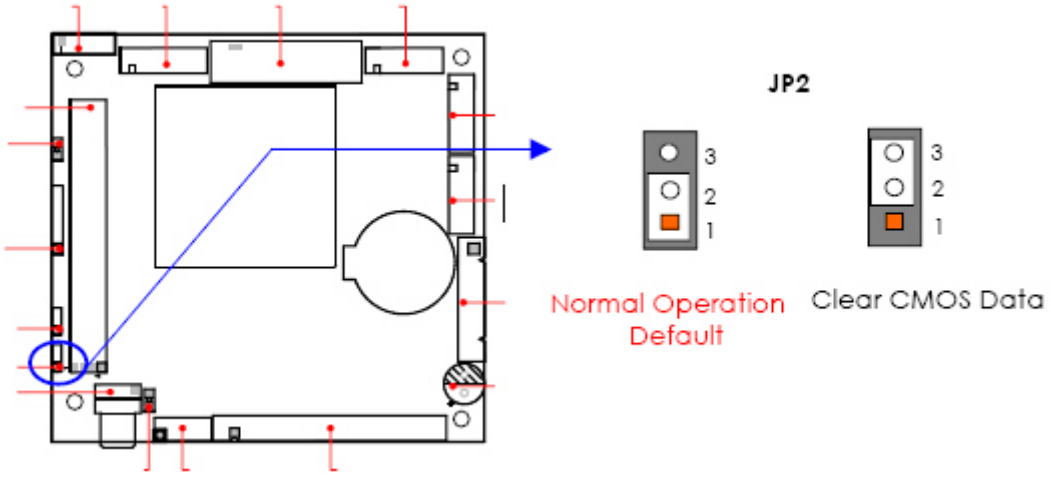




PIN	RS-232 Signal	DB9
1	-DCD	1
2	-DSR	6
3	RXD	2
4	-RTS	7
5	-TXD	3
6	-CTS	8
7	-DTR	4
8	-RI	9
9	GROUND	5
10	GROUND	Shield

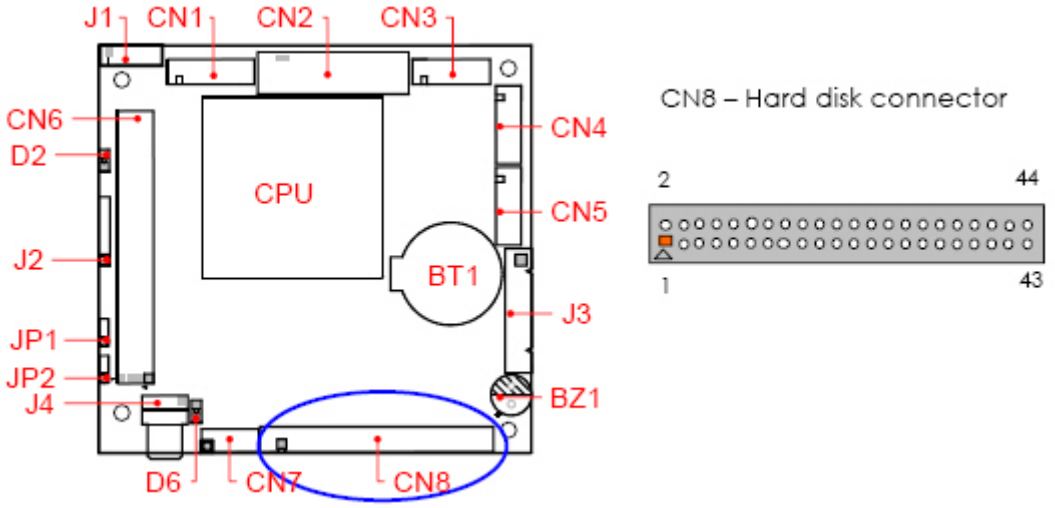
2.2.9 JP2: Clear CMOS Data

You can use JP2 to clear CMOS data. The CMOS stores information like system date, time, boot up device, password, IRQ… which are set up with the BIOS. To clear the CMOS, set JP2 to 2-3 and then return to 1-2 before system powers off. The default setting is 1-2.



2.2.10 CN8: IDE hard Disk Connectors

CN8 is 44-pin 2.0mm IDC connectors. Use the included hard disk cables to attach up to two 2.5” hard disk drives.

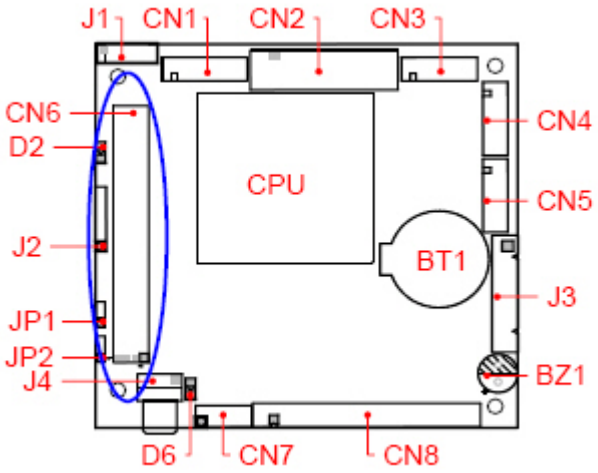


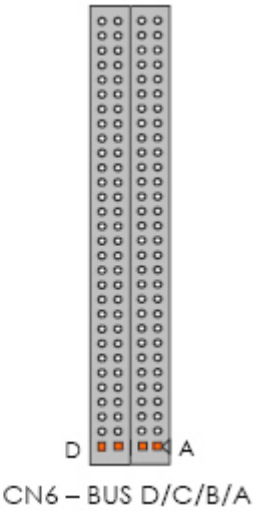
The following table lists the pin description of CN8.

Pin	Description	Pin	Description
1	-RESET	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	NOT USED
21	IDEDREQ	22	GROUND
23	-IOW A	24	GROUND
25	-IOR A	26	GROUND
27	IDEIORDYA	28	GROUND
29	-DACKA	30	GROUND
31	AINT	32	GROUND
33	SA 1	34	Not Used
35	SA 0	36	SA 2
37	CS 0	38	CS 1
39	HD LED A	40	GROUND
41	VCC	42	VCC
43	GROUND	44	Not Used

Note: Be careful with the pin orientation when installing connectors and the cables. A wrong connection can easily destroy your hard disk. CN8 is used to connect a 2.5" HDD with included 44-pin flat-cable or 44-pin DiskOnModule directly.

2.2.11 CN6: PCI-104 Bus Connectors



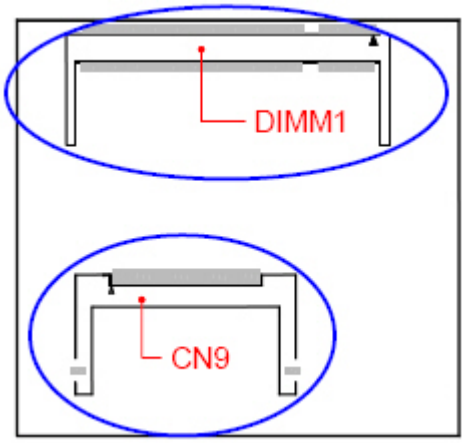


CN6 – BUS D/C/B/A

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	-	B1	-	C1	+ 5V	D1	AD0
A2	-	B2	AD2	C2	AD1	D2	+ 5V
A3	AD5	B3	GND	C3	AD4	D3	AD3
A4	CBE0#	B4	AD7	C4	GND	D4	AD6
A5	GND	B5	AD9	C5	AD8	D5	GND
A6	AD11	B6	-	C6	AD10	D6	M66EN
A7	AD14	B7	AD13	C7	GND	D7	AD12
A8	+ 3.3V	B8	CBE1#	C8	AD15	D8	+ 3.3V
A9	SERR#	B9	GND	C9	-	D9	PAR
A10	GND	B10	PERR#	C10	+ 3.3V	D10	GND
A11	STOP#	B11	+ 3.3V	C11	LOCK#	D11	GND
A12	+ 3.3V	B12	TRDY#	C12	GND	D12	DEVSEL#
A13	FRAME#	B13	GND	C13	IRDY#	D13	+ 3.3V
A14	GND	B14	AD16	C14	+ 3.3V	D14	CBE2#
A15	AD18	B15	+ 3.3V	C15	AD17	D15	GND
A16	AD21	B16	AD20	C16	GND	D16	AD19
A17	+ 3.3V	B17	AD23	C17	AD22	D17	+ 3.3V
A18	IDSEL0	B18	GND	C18	IDSEL1	D18	IDSEL2
A19	AD24	B19	CBE3#	C19	-	D19	IDSEL3
A20	GND	B20	AD26	C20	AD25	D20	GND
A21	AD29	B21	+ 5V	C21	AD28	D21	AD27
A22	+ 5V	B22	AD30	C22	GND	D22	AD31
A23	REQA	B23	GND	C23	REQB#	D23	-
A24	GND	B24	REQC	C24	+ 5V	D24	GNTA#
A25	GNTB#	B25	-	C25	GNTC#	D25	GND
A26	+ 5V	B26	PCICLK0	C26	GND	D26	PCICLK1
A27	PCICLK2	B27	+ 5V	C27	PCICLK3	D27	GND
A28	GND	B28	INTD#	C28	+ 5V	D28	PCIRST#
A29	-	B29	INTA#	C29	INTB#	D29	INTC#
A30	-	B30	-	C30	-	D30	-

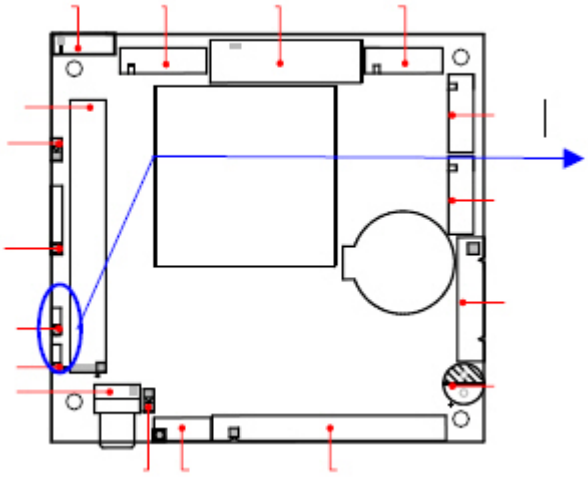
2.2.12 DIMM1: So-DIMM Socket

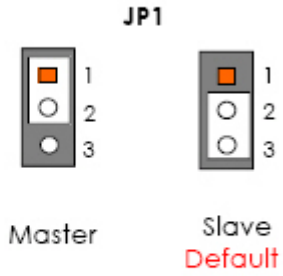
The DIMM1 socket on the solder side accepts 128MB to 1GB of DDR RAM modules



2.2.13 CN9 & JP1: Compact Flash Socket and Master/Slave Select

The Compact Flash socket CN9 (on the solder side) is optional and supports 3.3V Compact Flash and Micro Drives. JP1 is used to select master/slave device of this socket. Be sure to ward off the same master/slave setting with which connects to IDE (CN8) connector, if you use CN8 and CN9 simultaneously.

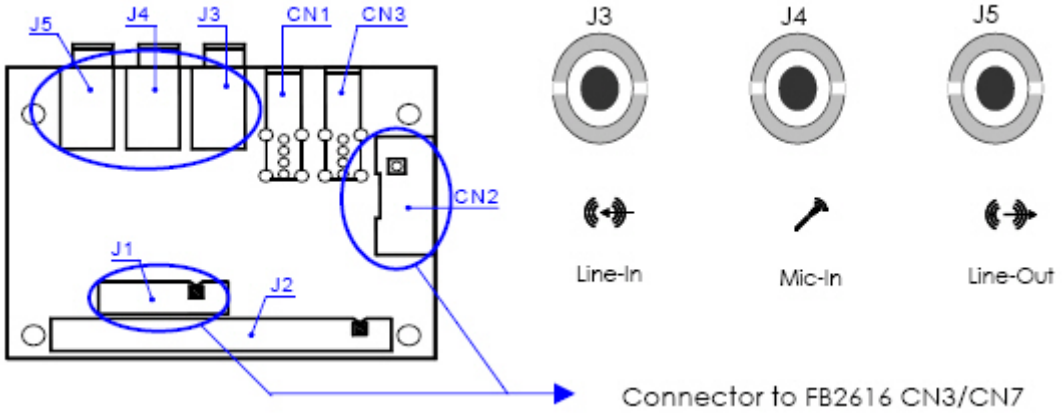




Note: The Compact Flash socket supports 3.3V Compact Flash and Micro Drives. The JP1 is used to select master/slave device of this socket and default is slave (close). Be sure not to set master/slave to the same IDE connector, if you use CF and IDE hard disk simultaneously.

2.2.14 FB4641x: Provides Audio and USB Board

The J3, J4, and J5 connectors on FB4641x are 2-way Line-In, mono Microphone input, and 2-way Lineout respectively. You can connect J1, CN2 cable from CPU2616 CN1 to CN7. The following figure shows these Audio connectors on FB4641x board:



3. Installing CRT & LCD Display

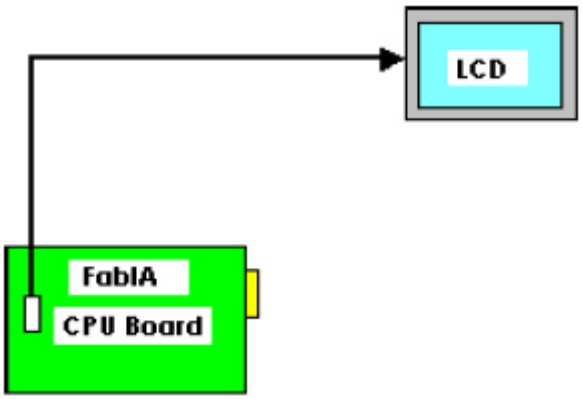
This chapter describes the configuration and installation procedure of LCD and CRT displays. Both CRT and LCD displays may be used at the same time. However, each type of LCD requires different BIOS. This section describes the configuration and installation procedure using LCD display. Skip this section if you are using CRT monitor only.

- LCD Flat Panel Display
- CRT & LCD Display

3.1 LCD Flat Panel Display

Using the BIOS setting for different types of LCD pane, then set your system properly and configures BOS setting for the right type of LCD panel you are using.

The following shows the block diagram of using CPU2616 for LCD display.



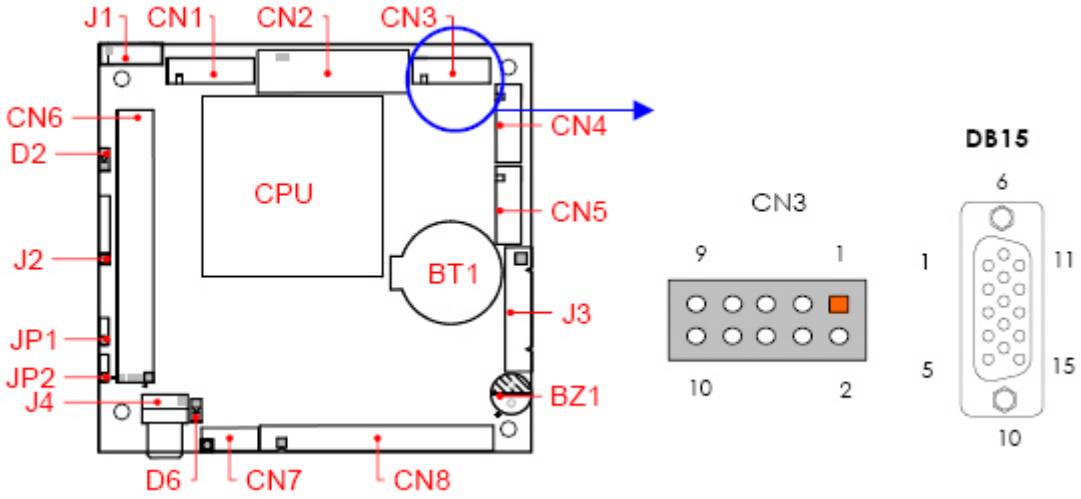
LCD Panel Block Diagram

The diagram shows that CPU2616 needs components to be linked with a LCD panel.

NOTE: Be careful with the pin orientation when installing connectors and the cables. A wrong connection can easily destroy your LCD panel. The pin 1 of the cable connectors is indicated with a sticker and the pin1 of the ribbon cable usually has a different color.

3.2 CRT Display (CN3)

The CPU2616 supports a CRT colored monitor. It can be connected to create a compact video solution for the industrial environment. 254MB simulated VRAM allows a maximum CRT resolution of 1920X1440 with 32 bpp at 85Hz. The following table and figure illustrate the pin definition of CN3 and D-sub 15-pin on the CRT adapter cable:

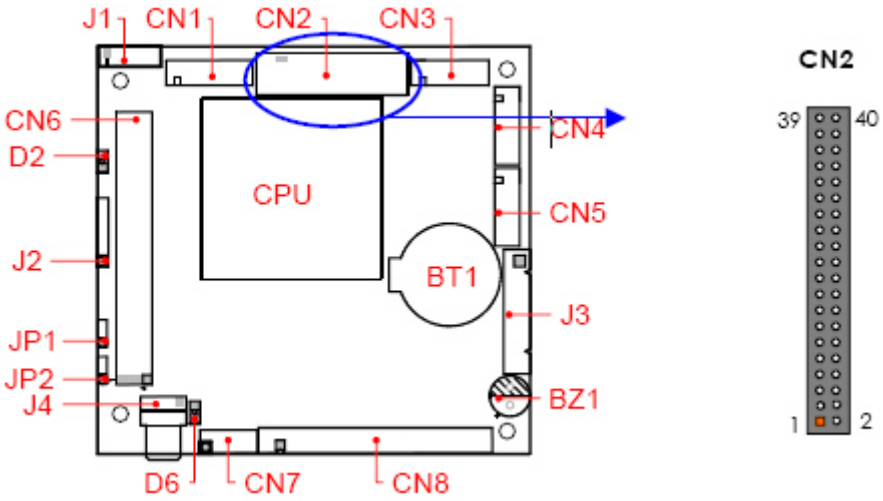


PIN	Signal	DB-15	PIN	Signal	DB15
1	RED	1	2	Case Ground	Case
3	GREEN	2	4	Digital Ground	5,10
5	BLUE	3	6	Analog Ground	6,7,8
7	VSYNC	14	8	DDC Data	12
9	HSYNC	13	10	DDC Clock	15

NOTE: Be careful with the pin orientation when installing VGA connector and the cable.

3.2.1 CN2: LCD Connector

CN2 is a 24-bit LCD interface connector. The pin assignments are listed in the following table.



Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	Ground	4	Ground
5	+3.3V	6	+3.3V
7	NC	8	Ground
9	FP0	10	FP1
11	FP2	12	FP3
13	FP4	14	FP5
15	FP6	16	FP7
17	FP8	18	FP9
19	FP10	20	FP11
21	FP12	22	FP13
23	FP14	24	FP15
25	FP16	26	FP17
27	FP18	28	FP19
29	FP20	30	FP21
31	FP22	32	FP23
33	Ground	34	Ground
35	SHFCLK	36	FP (VS)
37	DE	38	LP (HS)
39	ENVDD	40	ENAVEE

NOTE: If any trouble occurs when connecting CPU2616 with LCD panels, you could contact technical support division of FabiaTech Corporation.

4. BIOS Setup

This chapter describes the BIOS setup.

4.1 Overview

BIOS are a program located on a Flash memory chip of a circuit board. It is used to initialize and set up the I/O peripherals and interface cards of the system, which includes time, date, hard disk drive, the ISA bus and connected devices such as the video display, diskette drive, and the keyboard. This program will not be lost when you turn off the system.

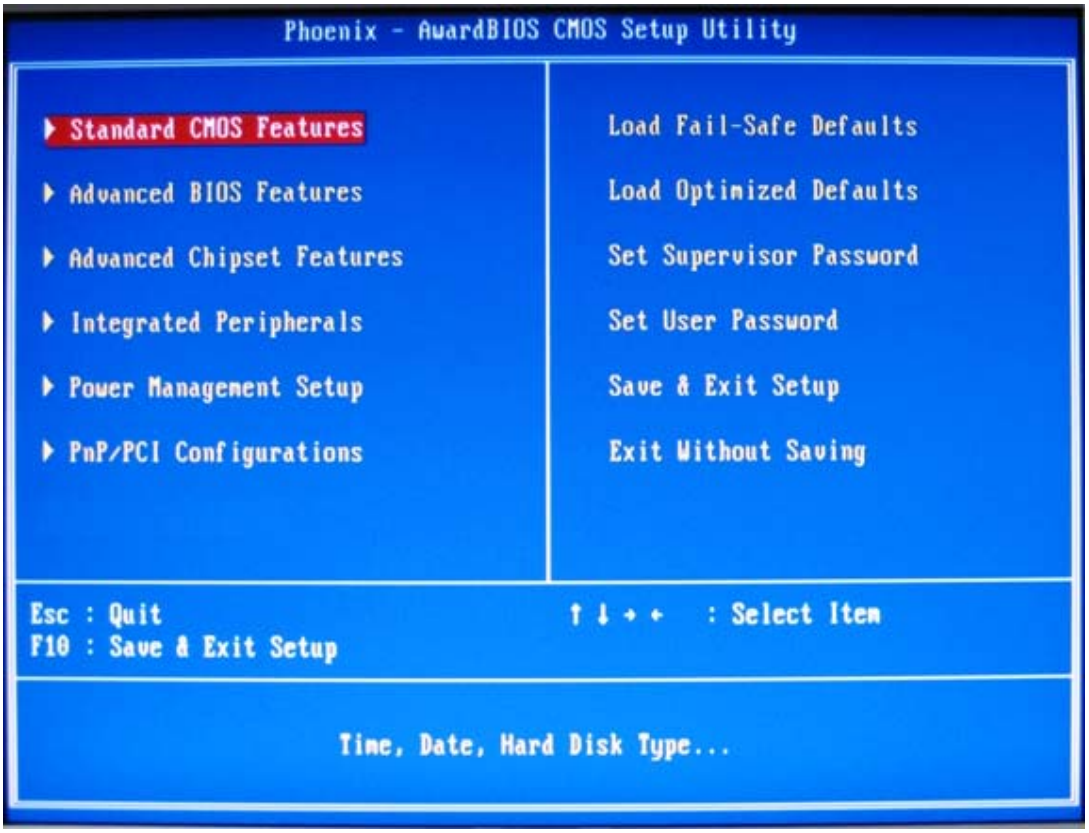
The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

The BIOS default values ensure that the system will function at its normal capability. In the worst situation the user may have corrupted the original settings set by the manufacturer.

All the changes you make will be saved in the system RAM and will not be lost after power-off.

When you start the system, the BIOS will perform a self-diagnostics test called Power On Self Test (POST) for all the attached devices, accessories, and the system. Press the [Del] key to enter the BIOS Setup program, and then the main menu will show on the screen.

Note: Change the parameters when you fully understand their functions and subsequences.



4.1.1 BIOS Functions

On the menu, you can perform the following functions

1. Standard CMOS Features
2. Advanced BIOS Features
3. Advanced Chipset Features
4. Integrated Peripherals
5. Power Management Setup
6. PNP/PCI Configuration
7. Frequency/Voltage Control
8. Set Supervisor Password
9. Set User Password
10. Load Optimized Default: to auto configure the system according to optimal setting with pre-defined values. This is also the factory default setting of the system when you receive the board.
11. Load Fail-Safe Default: to configure the system in fail-safe mode with predefined values.
12. Save Settings and Exit: perform this function when you change the setting and exit the BIOS Setup program.
13. Exit without saving: perform this function when you want to exit the program and do not save the change.

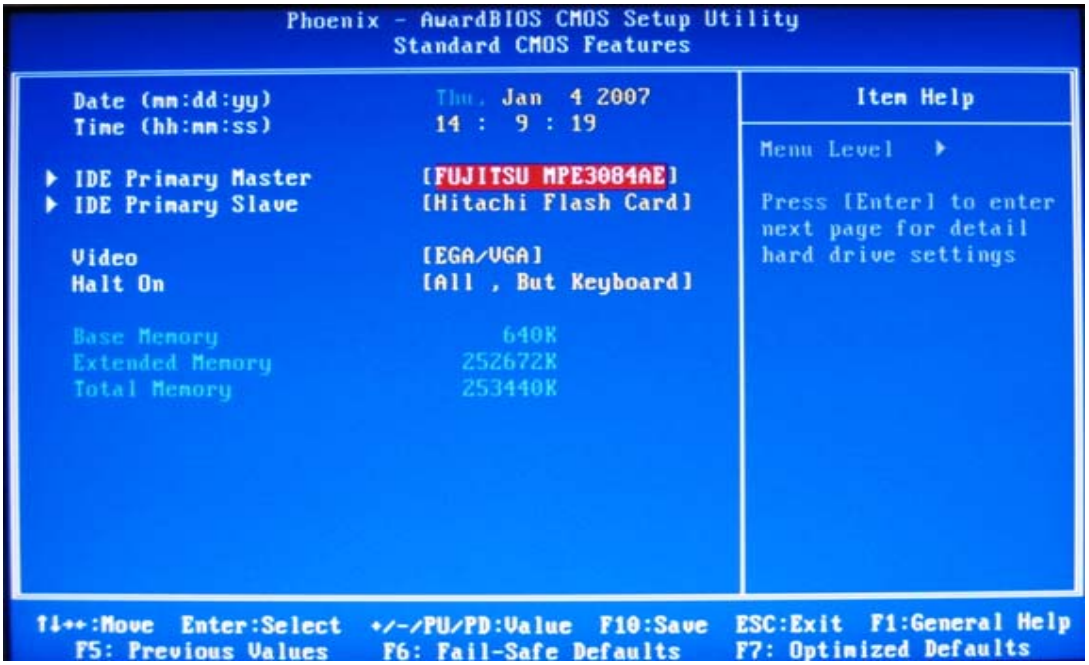
4.1.2 Keyboard Convention

On the BIOS, the following keys can be used to operate and manage the menu:

Item	Function
ESC	To exit the current menu or message
Page Up/Page Down	To select a parameter
F10	Save and exit
F1	General Help
F2	Item Help
F5	Previous Values
F6	Fail-Safe Defaults
F7	Optimized Defaults
F9	Menu in BIOS
UP/Down Arrow Keys	To go upward or downward to the desired item

4.2 Standard CMOS Setup

This section describes basic system hardware configuration, system clock setup and error handling. If the CPU board is already installed in a working system, you will not need to select this option anymore.


Phoenix - AwardBIOS CMOS Setup Utility
Standard CMOS Features
Date (mm:dd:yy) Thu, Jan 4 2007
Time (hh:mm:ss) 14 : 9 : 19
IDE Primary Master [FUJITSU MPE3084AE]
IDE Primary Slave [Hitachi Flash Card]
Video [EGA/VGA]
Halt On [All , But Keyboard]
Base Memory 640K
Extended Memory 252672K
Total Memory 253440K
Item Help
Menu Level ▸
Press [Enter] to enter next page for detail hard drive settings
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

4.2.1 Date & Time Setup

Highlight the <Date> field and then press the [Page Up] /[Page Down] or [+]/[-] keys to set the current date. Follow the month, day and year format.

Highlight the <Time> field and then press the [Page Up] /[Page Down] or [+]/[-] keys to set the current time. Follow the hour, minute and second format.

The user can bypass the date and time prompts by creating an AUTOEXEC.BAT file. For information on how to create this file, please refer to the MS-DOS manual.

4.2.2 Hard Disk Setup

The BIOS supports various types for user settings, The BIOS supports <Pri Master>, <Pri Slave>, so the user can install up to two hard disks. For the master and slave jumpers, please refer to the hard disk's installation descriptions and the hard disk jumper settings.

You can select <AUTO> under the <TYPE> and <MODE> fields. This will enable auto detection of your IDE drives during boot up. This will allow you to change your hard drives (with the power off) and then power on without having to reconfigure your hard drive type. If you use old-type hard disk drives, which do not support this feature, then you must configure the hard disk drive in the standard procedures as described above by the <USER> option.

4.2.3 Video

This option is to select the type of adapter used for the primary system monitor that must match your video display card and monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

You have two ways to boot up the system:

When VGA set as primary and monochrome set as secondary, the selection of the video type is " VGA Mode".

When monochrome is set as primary and VGA as secondary, the selection of the video type is "Monochrome Mode".

4.2.4 Halt On

This option determines whether the computer will stop if an error is detected during power up.

No errors	The system boot will not be stopped for any error that may be detected.
All errors	Whenever the BIOS detect a non-fatal error the system will be stopped and you will be prompted.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

4.2.5 Memory

This option is for the display-only which is determined by POST (Power On Self Test) of the BIOS.

4.2.6 Base Memory

The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memories installed on the motherboard, or 640K for systems with 640K or more memory installed on the motherboard.

4.2.7 Extended Memory

The BIOS determines how much extended memory is existing during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.

4.2.8 Other Memory

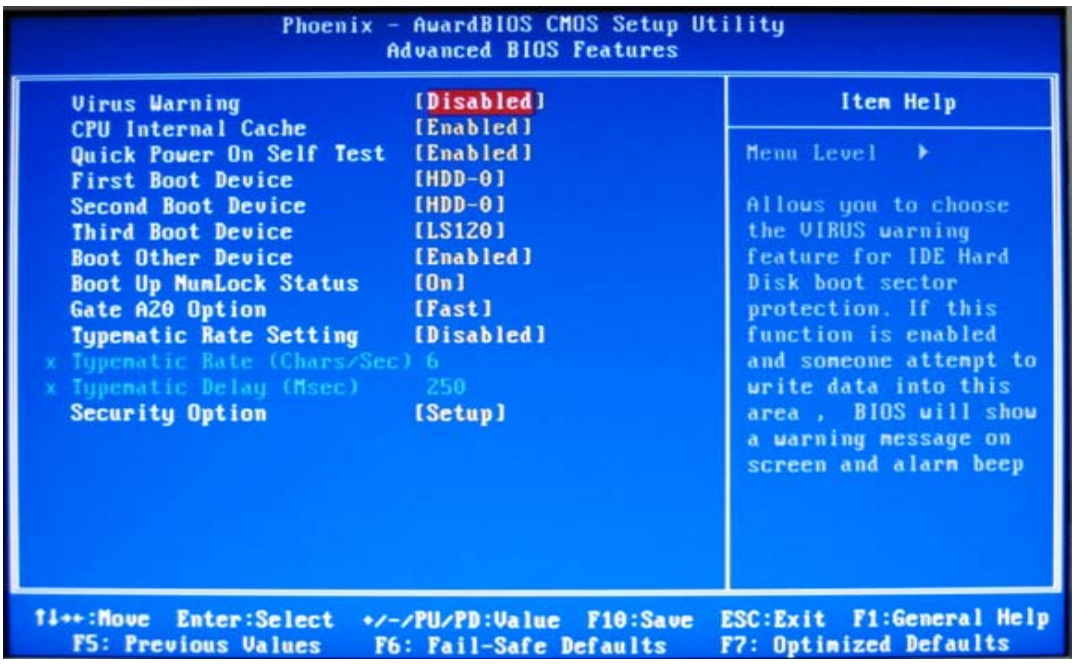
This refers to the memory located in the 640K to 1024K-address space. This is memory that can be used for different applications. DOS uses this area to load device drivers to keep as much base memory free for application programs. Most use for this area is Shadow RAM.

4.2.9 Total Memory

System total memory is the sum of basic memory, extended memory, and other memory.

4.3 BIOS Features Setup

This section describes the configuration entries that allow you to improve your system performance, or let you set up some system features according to your preference. Some entries here are required by the CPU board's design to remain in their default settings.


Phoenix - AwardBIOS CMOS Setup Utility
Advanced BIOS Features
Virus Warning [Disabled]
CPU Internal Cache [Enabled]
Quick Power On Self Test [Enabled]
First Boot Device [HDD-0]
Second Boot Device [HDD-0]
Third Boot Device [LS120]
Boot Other Device [Enabled]
Boot Up NumLock Status [On]
Gate A20 Option [Fast]
Typematic Rate Setting [Disabled]
x Typematic Rate (Chars/Sec) 6
x Typematic Delay (Msec) 250
Security Option [Setup]
Iten Help
Menu Level ▶
Allows you to choose the VIRUS warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area , BIOS will shou a warning message on screen and alarn beep
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

4.3.1 Virus Warning

This option may flash on the screen. During and after the system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and the following error message will appear, in the mean time, you can run an anti-virus program to locate the problem.

Available Options: Disabled, Enabled

Default setting: Disable

4.3.2 CPU Internal Cache

This functions speeds up memory access. The CPU has an internal cache.

Available options: Disabled, Enabled

Default setting: Enabled

Quick Power On Self Test

This option speeds up Power On Self Test (POST) after you power on the computer. If it is set to Enable, BIOS will shorten or skip some items' checks during POST.

Available options: Disabled, Enabled

Default setting: Enable

4.3.3 First /Second /Third/Boot Other Device/ Boot Device

This field specifies which device the system checks first upon power on.

Available options: LS120, Hard Disk, ZIP100, USB-ZIP, USB-CDROM, USB-HDD, LAN and Disable

Default setting: Hard Disk, CDROM, LAN

4.3.4 Boot Up Numlock status

This field is used to activate the Num Lock function upon system boot. If the setting is on, after a boot, the Num Lock light is lit, and user can use the number key.

Available options: On, Off

Default setting: On

4.3.5 Gate A20 Option

This item is chosen as <Normal>, the A20 signal is controlled by keyboard controller or chipset hardware.

Available options: Normal, Fast

Default setting: Normal

4.3.6 Typematic rate Setting

This function specifies the keystroke repeat rate when a key is pressed and held down on.

Available options: Disable, Enable

Default setting: Disable

Typematic Rate (Chars/Sec)

Typematic Rate sets the rate at which characters on the screen repeat when a key is pressed and held down on.

Available options: 6, 8, 10, 12, 15, 20, 24, or 30 characters per second

Default setting: 6

Typematic Delay (Msec)

The number selected indicates the time period between two identical characters appearing on screen.

Available options: 250,500 750 and 1000

Default setting: 250

4.3.7 Security Option

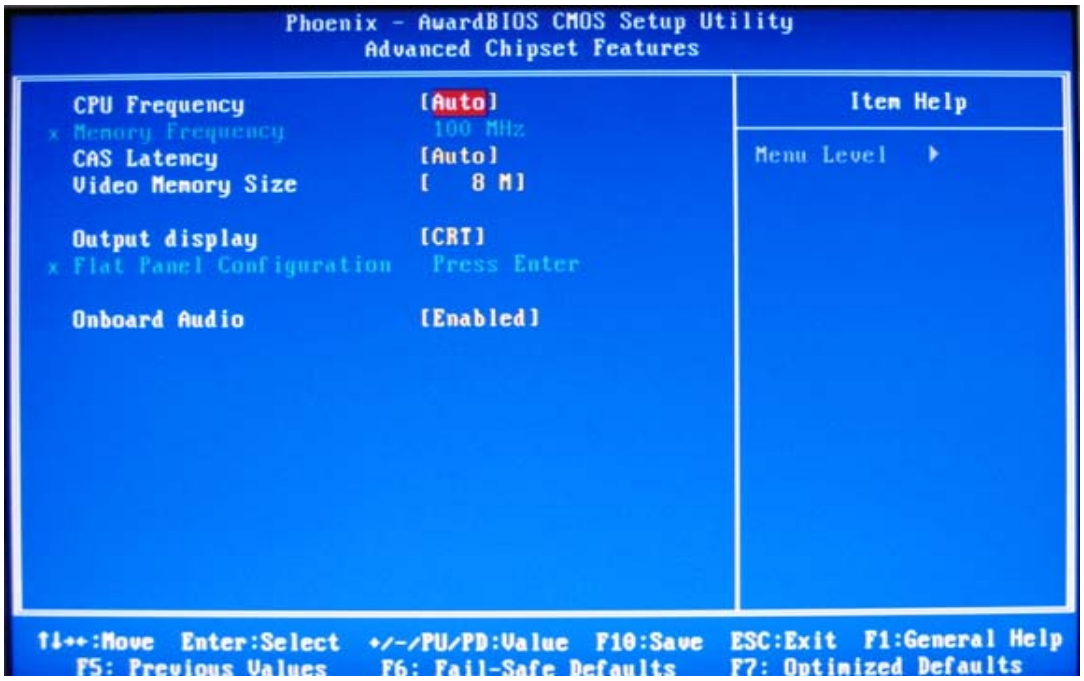
This field enables password checking every time when the computer is powered on or every time when the BIOS Setup is executed. If ***Always*** is chosen, a user password prompt appears every time and the BIOS Setup Program executes and the computer is turned on. If ***Setup*** is chosen, the password prompt appears if the BIOS executed.

Available options: Setup, Always

Default setting: Setup

4.4 Chipset Features Setup

This section describes the configuration of the board's chipset features.


Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features
CPU Frequency [Auto]
x Memory Frequency 100 MHz
CAS Latency [Auto]
Video Memory Size [8 M]
Output display [CRT]
x Flat Panel Configuration Press Enter
Onboard Audio [Enabled]
Item Help
Menu Level ▸
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

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4.4.1 CPU Frequency

This display sent by the CPU host clock and DDR-RAM memory clock

Available Options: Auto, 200 MHz, 300 MHz, 400 MHz, and 500 MHz

Default setting: Auto

Memory Frequency

This Select equates are used for determining the DDR-RAM Memory Clock frequency. SPD represents Serial Presence Detect. It is an 8-bit, 2048 bits EEPROM, built on the SDRAM for different frequencies.

Available Options: Auto, 100 MHz, 133 MHz, 166 MHz and 200 MHz

Default setting: 100 MHz

4.4.2 CAS Latency

This field specifies the latency for the DDR RAM system memory signals.

Available Options: Auto, 1.5, 2.0, 2.5, 3.0 and 3.5

Default setting: Auto

4.4.3 Video Memory Size

This field specifies which VGA display memory. You can select either Video memory on the VGA. There are setting share onboard memory.

Available Options: None M, 8MB, 16MB, 32MB, 64MB,128MB and 254MB

Default setting: 8MB

4.4.4 Output Display

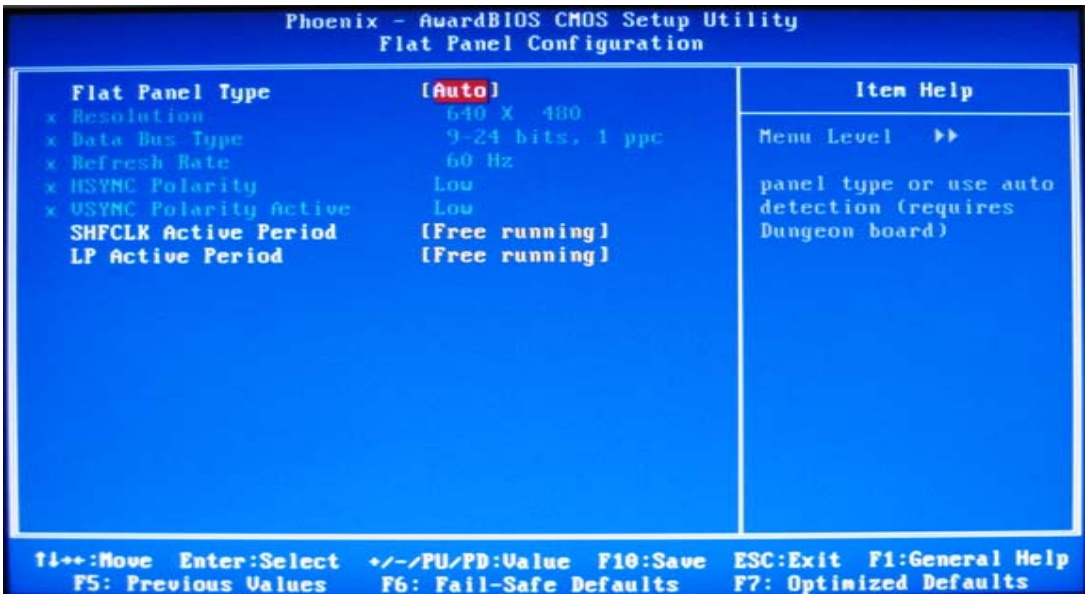
This field specifies which VGA display will be used when the system is boot. You can select either the Flat Panel or the CRT booting on the VGA.

Available Options: Flat Panel, CRT and Panel & CRT

Default setting: CRT

Flat Panel Configuration

When using the LCD, the field specifies the selections of display resolution for different TFT LCD display type.


Phoenix - AwardBIOS CMOS Setup Utility
Flat Panel Configuration
Flat Panel Type [Auto]
x Resolution 640 X 480
x Data Bus Type 9-24 bits, 1 ppc
x Refresh Rate 60 Hz
x HSYNC Polarity Low
x VSYNC Polarity Active Low
SHFCLK Active Period [Free running]
LP Active Period [Free running]
Item Help
Menu Level ▸▸
panel type or use auto detection (requires Dungeon board)
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

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Flat Panel Type

See the Flat Panel Display Table

Available Options: Auto and TFT

Default setting: Auto

Flat Panel Display LCD Type Table

Resolution
320x240
640x480
800x600
1024x768
1152x864
1280x1024
1600x1200

Data Bus Type

This field specifies the Data Bus width and data type

Available Options: 18,24 bits, 1 ppc and 18,24 bits, 2 ppc

Default setting: 18,24 bits, 1 ppc

Refresh Rate

This field specifies the refresh rate required by the panel

Available Options: 60 Hz, 70Hz, 72 Hz, 75 Hz, 85 Hz, 90 Hz and 100 Hz

Default setting: 60 Hz

HSYNC/VSYNC Polarity Active

This field specifies the HSYNC/VSYNC signal to the panel

Available Options: Low and High

Default setting: Low

LP Active Period

This field specifies the LDE/MOD signal to the panel

Available Options: Free running and Active Only

Default setting: Free running

4.4.5 Onboard Audio

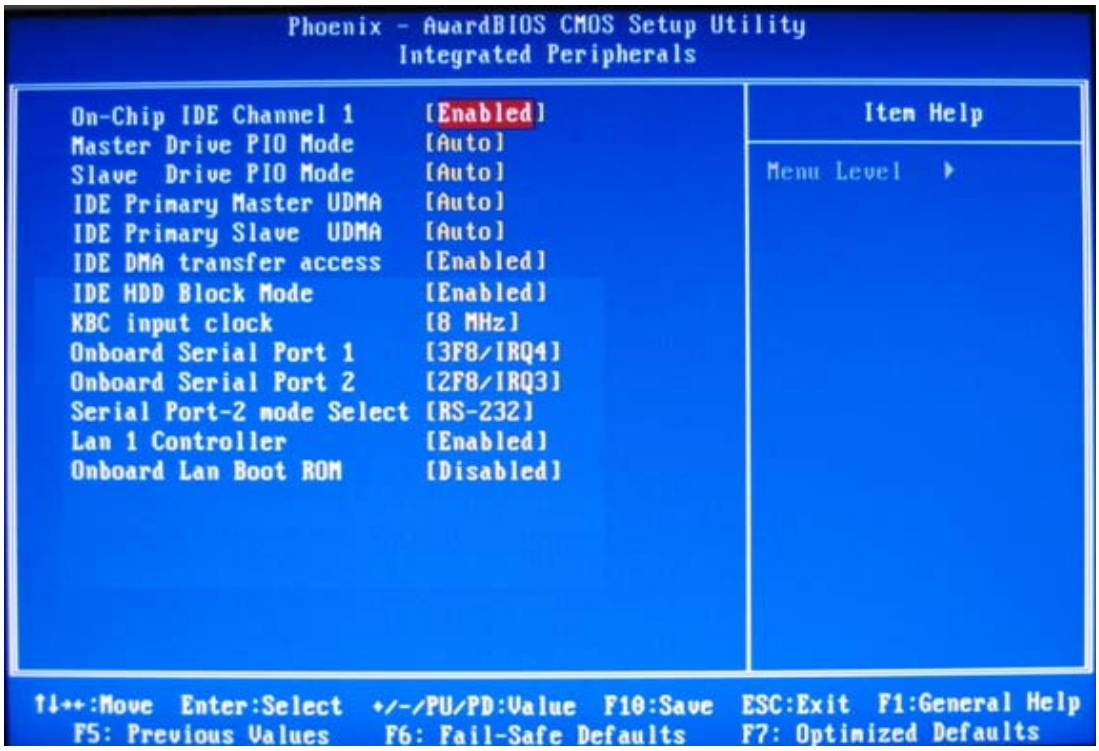
This field specifies the internal Audio Control.

Available Options: Disable, Enable

Default setting: Enable

4.5 Peripheral Setup

This section describes the function of peripheral features.


Phoenix - AwardBIOS CMOS Setup Utility
Integrated Peripherals
On-Chip IDE Channel 1 [Enabled]
Master Drive PIO Mode [Auto]
Slave Drive PIO Mode [Auto]
IDE Primary Master UDMA [Auto]
IDE Primary Slave UDMA [Auto]
IDE DMA transfer access [Enabled]
IDE HDD Block Mode [Enabled]
KBC input clock [8 MHz]
Onboard Serial Port 1 [3F8/IRQ4]
Onboard Serial Port 2 [2F8/IRQ3]
Serial Port-2 mode Select [RS-232]
Lan 1 Controller [Enabled]
Onboard Lan Boot ROM [Disabled]
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

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4.5.1 On-Chip Primary IDE Channel 1

This field specifies the IDE channel that can be applied when using IDE hard disk connector.

Available Options: Disabled, Enable

Default setting: Enable

4.5.2 Master /Slave Drive PIO mode

IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship, which is determined by the cabling configuration used to attach them to the controller.

PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to affect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by them. This is simpler and more efficient (and faster). Your system supports five modes, numbered from 0 to 4, which primarily differs in timing. When Auto is selected, the BIOS will select the best available mode.

4.5.3 IDE Primary Master/Slave UDMA

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party

IDE bus master driver). If your hard drive and your system software both support Ultra DMA/33, select Auto to enable this option, which allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

4.5.4 IDE HDD Block Mode

This option allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

4.5.5 OnBoard UART/IRQ Port 1/2,

These fields select the I/O port address for each Serial port.

Available Options: Disabled, 3F8H/IRQ4, 2F8H/IRQ3, and 3E8H/IRQ4, 2E8H/IRQ3.

Default setting: 3F8/IRQ4 and 2F8H/IRQ3

4.5.6 LAN1 Controller

This field specifies the Enable or Disable of the onboard LAN chip.

Available Options: Disabled, Enable

Default setting: Enable

4.5.7 Onboard LAN Boot ROM

This field specifies the PXE boot ROM of the onboard LAN chip.

Available Options: Disabled, Enable

Default setting: Disable

4.6 Power Management

Phoenix - AwardBIOS CMOS Setup Utility
Power Management Setup
Power Management [APM]
** PM Timers **
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

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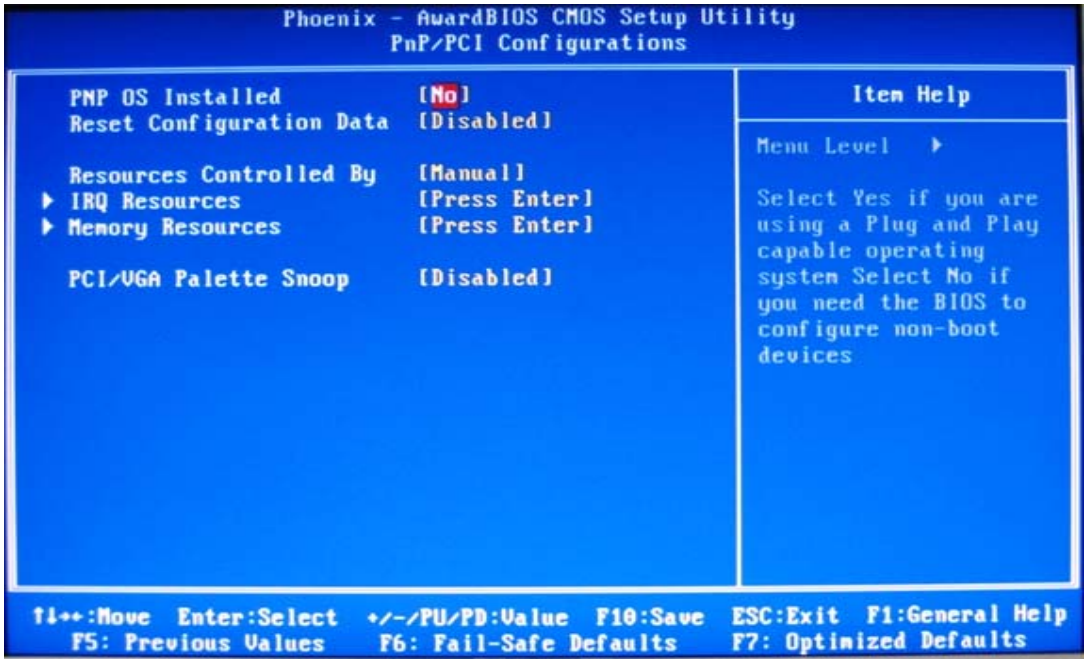
Power Management

The field determines how much power consumption is needed for the system after selecting the below items.

Standby Mode

This field defines the continuous idle time before the system enters Standby Mode. If any item defined is enabled & active Standby timer will be reloaded.

4.7 PCI/Plug and Play


Phoenix - AwardBIOS CMOS Setup Utility
PnP/PCI Configurations
PNP OS Installed [No]
Reset Configuration Data [Disabled]
Resources Controlled By [Manual]
IRQ Resources [Press Enter]
Memory Resources [Press Enter]
PCI/VGA Palette Snoop [Disabled]
Item Help
Menu Level ▶
Select Yes if you are using a Plug and Play capable operating system Select No if you need the BIOS to configure non-boot devices
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

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4.7.1 PNP O/S Installed

Set to Yes to inform BIOS that the operating system can handle Plug and Play (PnP) devices.

Available Options: Yes, No

Default setting: No

4.7.2 Reset Configuration Data: Enable, Disable

If you select Enable to reset Extended System Configuration Data (ESCD) when you exit setup is you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operation operating system cannot boot.

Available Options: Enable, Disable

Default setting: Disable

4.7.3 Resources Controlled By: Auto, Manual

If you select Enable to reset Extended System Configuration Data (ESCD) when you exit setup which you have installed a new add-on card and the system reconfiguration has caused such a serious conflict that the operation system cannot boot.

Available Options: Auto. , Manual

Default setting: Manual

IRQ-n/DMA-n Assigned: PCI/Reserved PnP

The resources are controlled manually.

1. Reserved Devices compliant with the original PC AT bus specification, and require a specific interrupt/DMA (such as IRQ4, IRQ3 for serial port 1 and 2).

2. PCI/Reserved PnP Devices compliant with Plug and play standard, whether to be designed for PCI or Reserved.

Memory Source: Resources Controlled By: Auto, Manual

Select a base address for the memory area used by any peripheral that requires high memory.

Available Options: N/A, C800, CC00, D000, D400, D800 and DC00

Default setting: N/A

4.7.4 PCI/VGA Palette Snoop

This option must be set to Enabled if any ISA adapter card installed in the computer requiring VGA palette snooping.

Available options: Enable, Disable

Default setting: Disable

4.8 Password Setup

There are two security passwords: Supervisor and User. Supervisor is a privileged person that can change the User password from the BIOS.

According to the default setting, both access passwords are not set up and are only valid after you set the password from the BIOS.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password.**
2. Type the desired password (up to 8 character length) when you see the message, “Enter New Supervisor Password.”
3. Then you can go on to set a user password (up to 8 character length) if required. Note that you cannot configure the User password until the Supervisor password is set up.
4. Enter Advanced CMOS Setup screen and point to the Password Checkup field.
5. Select Always or Setup.

Always: a visitor who attempts to enter BIOS or operating system will be prompted for password.

Setup: a visitor who attempts to the operating system will be prompted for user password. You can enter either User password or Supervisor password.

6. Point to **Save Settings and Exit** and press Enter.
7. Press Y when you see the message, “Save Current Settings and Exit (Y/N)?”

Note: it is suggested that you write down the password in a safe place to avoid that password may be forgotten or missing.

To set the password, please complete the following steps.

1. Select **Change Supervisor Password**.

2. Press Enter instead of entering any character when you see the message, “Enter New Supervisor Password.”

3. Thus you can disable the password.

5. Driver and Utility

The enclosed diskette includes CPU2616 VGA, AUDIO driver and LAN driver. To install and configure you CPU2616 system, you need to perform the following steps.

5.1 VGA Drivers

5.1.1 WINDOWS XP Driver

1. To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA> Geode_LX >WINXP. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to a CF.
2. Open Control Panel. [Start->Settings->Control Panel].
3. Click on System button> Select Hardware >click on Device Manager.
4. Click on Video Controller (VGA Compatible) >Update Driver> Select Specify a location > Browse > Select "lX_win " file from CF .
5. Click on OK >Next >Yes >Finish
6. In the WINDOWS-XP, you can find the <DISPLAYL> icon located in the {CONTROL PANEL} group.
7. Adjust the <Resolution> and <Color>,

5.2 LAN Utility & Driver

1. To install the LAN utility OR driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8139C>DIAG. If your system is not equipped with a CD ROM device, copy the LAN driver from the CD ROM to a CF.
2. Execute install.exe file.
3.

Note: In the LAN directory, a HELPME.EXE file is included to provide installation information.

5.3 Audio Drivers

5.3.1 WINDOWS XP Driver

1. To install the Audio driver, insert the CD ROM into the CD ROM device, and enter DRIVER>AUDIO>CS5536>WINXP. If your system is not equipped with a CD ROM device, copy the Audio driver from the CD ROM to a CF.
2. Open Control Panel. [Start->Settings->Control Panel].
3. Click on System button> Select Hardware >click on Device Manager.
4. Click on Multimedia Audio Controller >Update Driver> Select Specify a location > Browse > Select "lxWDMAu " file from CF .
5. Click on OK >Next >Yes >Finish

5.4 AES Drivers

5.4.1 WINDOWS XP Driver

1. To install the SysChip driver, insert the CD ROM into the CD ROM device, and enter DRIVER>SysChip>GeodeLX_XP_AES. If your system is not equipped with a CD ROM device, copy the AES driver from the CD ROM to a CF.
2. On the target LX processor computer running Windows XP, open the device manager
3. Find the question mark on "Entertainment Encryption/Decryption Device" in Other Devices.
4. Pick "Install from a list or specific location" and click next.
5. Pick "Don't search. I will choose the driver to install." and click next.
6. Pick "Show All Devices", wait, and pick "Have Disk".
7. It will come back with "Geode LX AES Crypto Driver", click Next.
8. Click yes to the warning box that comes up.

5.5 BIOS Flash Utility

In the <UTILITY> directory, there is the FLASH845.EXE file.

Step 1: Use the AWDFLASH.EXE program to update the BIOS setting.

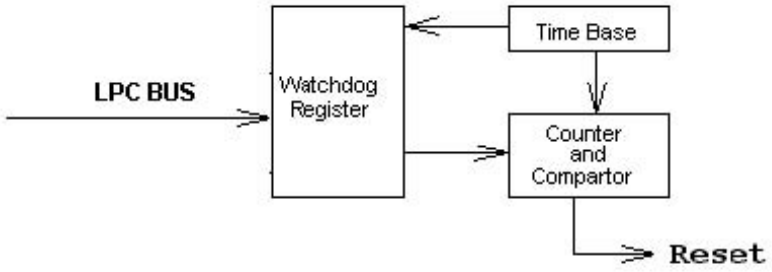
Step 2: And then refer to the chapter “BIOS Setup”, as the steps to modify BIOS.

Step 3: Now the CPU board’s BIOS loaded with are the newest program; user can use it to modify BIOS function in the future, when the BIOS add some functions.

5.6 Watchdog Timer

This section describes how to use the Watchdog Timer, including disabled, enabled, and trigger functions.

The CPU2616 is equipped with a programmable time-out period watchdog timer. You can use your own program to enable the watchdog timer. Once you have enabled the watchdog timer, the program should trigger the I/O every time before the timer times out. If your program fails to trigger or disable this timer before it times out, e.g. because of a system hang-up, it will generate a reset signal to reset the system. The time-out period can be programmed to be set from 1 to 255 seconds or minutes.



The CD –ROM includes a Watch Dog demo file. In the file, there are 3 execution programs written in different forms. The sub-directories of the file are:

1. WATCHDOG/ASSEMBLE: Library and Test Program written in Assembly Language
2. WATCHDOG/TURBOC: Library and Test Program written in Turbo C++

The WATCHDOG includes a demonstration program established for users who would like to configure the Watchdog timer by themselves.

Note: In the WATCHDOG/ITE8712 directory, README.TXT file is included to provide demo program information.

.

5.6.1 Watchdog Timer Setting

The watchdog timer is a circuit that may be used from your program software to detect system crashes or hang-ups. LED on the Front side is the watchdog timer indicator. Whenever the watchdog timer is enabled, the LED will blink to indicate that the timer is counting. The watchdog timer is automatically disabled after reset.

Once you have enabled the watchdog timer, your program must trigger the watchdog timer every time before it times out. After you trigger the watchdog timer, it will be set to non-zero value to watchdog counter and start to count down again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system.

The factor of the watchdog timer time-out constant is approximately 1 second. The period for the watchdog timer time-out is between 1 to FF timer factors.

If you want to reset your system when watchdog times out, the following table listed the relation of timer factors between time-out periods.

Time Factor	**Time-Out Period (Seconds)**	**Time-Out Period (Minutes)**
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
“	“	“
“	“	“
“	“	“
FF	FF	FF

.

5.6.2 Watchdog Timer Enabled

To enable the watchdog timer, you have to output a byte of timer factor to the watchdog. The following is a Turbo C++ program, which demonstrates how to enable the watchdog timer and set the time-out period at 6 seconds.

```
#include “stdio.H”
#include “WDLIB.H”

main( )
{
char WD_TIME=ox6;

InitWD(equWdUnitS);
printf (“Enable watchdog”);
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

5.6.3 Watchdog Timer Trigger

After you enable the watchdog timer, your program must write the same factor as enabling to the watchdog register at least once every time-out period to its previous setting. You can change the time-out period by writing another timer factor to the watchdog register at any time, and you must trigger the watchdog before the new time-out period in the next trigger. Below is a Turbo C++ program, which demonstrates how to trigger the watchdog timer:

```
#include “stdio.H”
#include “WDLIB.H”

main( )
{
char WD_TIME=ox6;

InitWD(equWdUnitS);
printf (“Enable watchdog”);
//Trigger watchdog Timer Output is 6 seconds
EnWD(WD_TIME);
}
```

5.6.4 Watchdog Timer Disabled

To disable the watchdog timer, simply write a 00H to the watchdog register.

```
#include “stdio.H”
#include “WDLIB.H”

main( )
{
InitWD(equWdUnitS);
printf (“Disable Watch Dog”);
//Disable watch dog
DisWD(WD_TIME);
}
```

6. Technical Reference

This section outlines the errors that may occur when you operate the system, and also gives you the suggestions on solving the problems.

Topic include:

Trouble Shooting for Post Beep & Error Messages

Technical Reference

6.1 Trouble Shooting for Post Beep and Error Messages

The following information informs the Post Beep & error messages. Please adjust your systems according to the messages below. Make sure all the components and connectors are in proper position and firmly attached. If the errors still exist, please contact with your distributor for maintenance.

6.1.1 POST BEEP

Currently there are two kinds of beep codes in BIOS setup.

One indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by three short beeps.

The other indicates that an error has occurred in your DRAM. This beep code consists of a constant single long beep.

6.1.2 Error Message

CMOS BATTERY FAILURE

When the CMOS battery is out of work or has run out, the user has to replace it with a new battery.

CMOS CHECKSUM ERROR

This error informs that the CMOS has corrupted. When the battery runs weak, this situation might happen. Please check the battery and change a new one when necessary.

DISK BOOT FAILURE

When you can‘t find the boot device, insert a system disk into Drive A and press < Enter >. Make sure both the controller and cables are all in proper positions, and also make sure the disk is formatted. Then reboot the system.

DISKETTE DRIVES OR TYPES MISMATCH ERROR

When the diskette drive type is different from CMOS, please run setup or configure the drive again.

ERROR ENCOUNTERED INITIALIZING HARD DRIVE

When you can‘t initializes the hard drive, ensure the following things:

1. The adapter is installed correctly
2. All cables are correctly and firmly attached
3. The correct hard drive type is selected in BIOS Setup

ERROR INITIALIZING HARD DISK CONTROLLER

When this error occurs, ensure the following things:

1. The cord is exactly installed in the bus.
2. The correct hard drive type is selected in BIOS Setup
3. Whether all of the jumpers are set correctly in the hard drive

KEYBOARD ERROR OR NO KEYBOARD PRESENT

When this situation happens, please check keyboard attachment and no keys being pressed during the boot. If you are purposely configuring the system without a keyboard, set the error halt condition in BIOS Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot procedure.

MEMORY ADDRESS ERROR

When the memory address indicates error, you can use this location along with the memory map for your system to find and replace the bad memory chips.

MEMORY SIZE HAS CHANGED

Memory has been added or removed since last boot. In EISA mode, use Configuration Utility to re-configure the memory configuration. In ISA mode enter BIOS Setup and enter the new memory size in the memory fields.

MEMORY VERIFYING ERROR

It indicates an error verifying a value is already written to memory. Use the location along with your system's memory map to locate the bad chip.

OFFENDING ADDRESS MISSING

This message is used in connection with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

REBOOT ERROR

When this error occurs that requires you to reboot. Press any key and the system will reboot.

SYSTEM HALTED

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

6.2 Technical Reference

6.2.1 Physical and Environmental

Temperature: Operating 0°C ~ 60°C

Relative humidity 5 % to 95 % non-condensing

6.2.2 Real-Time Clock and Non-Volatile RAM

The CPU2616 contains a real-time clock compartment that maintains the date and time in addition to storing configuration information about the computer system. It contains 14 bytes of clock and control registers and 114 bytes of general purpose RAM. Because of the use of CMOS technology, it consumes very little power and can be maintained for long periods of time using an internal Lithium battery. The contents of each byte in the CMOS RAM are listed below:

Address	Description
00	Seconds
01	Second alarm
02	Minutes
03	Minute alarm
04	Hours
05	Hour alarm
06	Day of week
07	Date of month
08	Month
09	Year
0A	Status register A
0B	Status register B
0C	Status register C
0D	Status register D
0E	Diagnostic status byte
0F	Shutdown status byte
10	Diskette drive type byte, drive A and B
11	Fixed disk type byte, drive C
12	Fixed disk type byte, drive D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	Low actual expansion memory byte
31	High actual expansion memory byte
32	Date century byte
33	Information flags (set during power on)
34-7F	Reserved for system BIOS

6.2.3 CMOS RAM Map

Register	Description
00h -10h	Standard AT-compatible RTC and Status and Status Register data definitions
11h – 13h	Varies
14h	Equipment Bits 7-6 Number of Floppy Drives 00 1 Drive 01 2 Drives Bits 5-4 Monitor Type 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bits 3 Display Enabled 0 Disabled 1 Enabled Bit 2 Keyboard Enabled 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bit 1 Math Coprocessor Installed 0 Absent 1 Present Bit 0 Floppy Drive Installed 0 Disabled 1 Enabled
15h	Base Memory (in 1KB increments), Low Byte
16h	Base Memory (in 1KB increments), High Byte
17h	IBM-compatible memory (in 1KB increments), Low Byte
18h	IBM-compatible memory (in 1KB increments), High Byte (max 15 MB)
19h-2Dh	Vaires
2Eh	Standard CMOS RAM checksum, high byte
2Fh	Standard CMOS RAM checksum, low byte
30h	IBM-compatible Extended Memory, Low Byte (POST) in KB
31h	IBM-compatible Extended Memory, High Byte (POST) in KB
32h	Century Byte
33h	Reserved. Do not use
34h	Reserved. Do not use
35h	Low byte of extended memory (POST) in 64 KB
36h	High byte of extended memory (POST) in 64 KB
37h-3Dh	Varies
3Eh	Extended CMOS Checksum, Low Byte (including 34h-3Dh)
3Fh	Extended CMOS Checksum, High Byte (including 34h-3Dh)

6.2.4 I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses, which also becomes the identity of the device. There is a total of 1K-port address space available. The following table lists the I/O port addresses used on the Industrial CPU Card.

Address	**Device Description**
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 073h	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
290h – 297h	System Chipset
2E8h – 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
378h - 3FFh	Parallel Port #1(LPT1)
360 - 36F	Network Ports
3B0 - 3BF	Monochrome & Printer adapter
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
3E8h – 3EFh	Serial Port #3(COM3)
3F0h - 3F7h	Floppy Disk Controller
3F8h - 3FFh	Serial Port #1(COM1)

6.2.5 Interrupt Request Lines (IRQ)

There are a total of 15 IRQ lines available on the Industrial CPU Card. Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on the Industrial CPU Card.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	USB
IRQ6	- Reserved -
IRQ7	- Reserved -
IRQ8	Real Time Clock
IRQ9	- Reserved -
IRQ10	Display Control
IRQ11	LAN
IRQ12	PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE
IRQ15	- Reserved -

6.2.6 DMA Channel Map

The equivalent of two 8237A DMA controllers is implemented in the CPU2616 board. Each controller is a four-channel DMA device that will generate the memory addresses and control signals necessary to transfer information directly between a peripheral device and memory. This allows high speeding information transfer with less CPU intervention. The two DMA controllers are internally cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1) and three channels for transfers to 16-bit peripherals (DMA2). DMA2 channel 0 provides the cascade interconnection between the two DMA devices, thereby maintaining IBM PC/AT compatibility.

The following is the system information of DMA channels:

DMA Controller 1	DMA Controller 2
Channel 0: Spare	Channel 4: Cascade for controller 1
Channel 1: Reserved for IBM SDLC	Channel 5: Spare
Channel 2: Diskette adapter	Channel 6: Spare
Channel 3: Spare	Channel 7: Spare

6.2.7 Serial Ports

The ACEs (Asynchronous Communication Elements ACE1 to ACE2) are used to convert parallel data to a serial format on the transmit side and convert serial data to parallel on the receiver side. The serial format, in order of transmission and reception, is a start bit, followed by five to eight data bits, a parity bit (if programmed) and one, one and half (five-bit format only) or two stop bits. The ACEs are capable of handling divisors of 1 to 65535, and produce a 16x clock for driving the internal transmitter logic.

Provisions are also included to use this 16x clock to drive the receiver logic. Also included in the ACE a completed MODEM control capability, and a processor interrupt system that may be software tailored to the computing time required to handle the communications link.

The following table is a summary of each ACE accessible register

DLAB	Port Address	Register
0	Base + 0	Receiver buffer (read)
		Transmitter holding register (write)
0	Base + 1	Interrupt enable
X	Base + 2	Interrupt identification (read only)
X	Base + 3	Line control
X	Base + 4	MODEM control
X	Base + 5	Line status
X	Base + 6	MODEM status
X	Base + 7	Scratched register
1	Base + 0	Divisor latch (least significant byte)
1	Base + 1	Divisor latch (most significant byte)

Receiver Buffer Register (RBR)

Bit 0-7: Received data byte (Read Only)

Transmitter Holding Register (THR)

Bit 0-7: Transmitter holding data byte (Write Only)

Interrupt Enable Register (IER)

Bit 0: Enable Received Data Available Interrupt (ERBFI)

Bit 1: Enable Transmitter Holding Empty Interrupt (ETBEI)

Bit 2: Enable Receiver Line Status Interrupt (ELSI)

Bit 3: Enable MODEM Status Interrupt (EDSSI)

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Interrupt Identification Register (IIR)

Bit 0: “0” if Interrupt Pending

Bit 1: Interrupt ID Bit 0

Bit 2: Interrupt ID Bit 1

Bit 3: Must be 0

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Line Control Register (LCR)

Bit 0: Word Length Select Bit 0 (WLS0)

Bit 1: Word Length Select Bit 1 (WLS1)

WLS1	WLS0	Word Length
0	0	5 Bits
0	1	6 Bits
1	0	7 Bits
1	1	8 Bits

Bit 2: Number of Stop Bit (STB)

Bit 3: Parity Enable (PEN)

Bit 4: Even Parity Select (EPS)

Bit 5: Stick Parity

Bit 6: Set Break

Bit 7: Divisor Latch Access Bit (DLAB)

MODEM Control Register (MCR)

Bit 0: Data Terminal Ready (DTR)

Bit 1: Request to Send (RTS)

Bit 2: Out 1 (OUT 1)

Bit 3: Out 2 (OUT 2)

Bit 4: Loop

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

Line Status Register (LSR)

Bit 0: Data Ready (DR)

Bit 1: Overrun Error (OR)

Bit 2: Parity Error (PE)

Bit 3: Framing Error (FE)

Bit 4: Break Interrupt (BI)

Bit 5: Transmitter Holding Register Empty (THRE)

Bit 6: Transmitter Shift Register Empty (TSRE)

Bit 7: Must be 0

MODEM Status Register (MSR)

Bit 0: Delta Clear to Send (DCTS)

Bit 1: Delta Data Set Ready (DDSR)

Bit 2: Training Edge Ring Indicator (TERI)

Bit 3: Delta Receive Line Signal Detect (DSLSD)

Bit 4: Clear to Send (CTS)

Bit 5: Data Set Ready (DSR)

Bit 6: Ring Indicator (RI)

Bit 7: Received Line Signal Detect (RSLD)

Divisor Latch (LS, MS)

	LS	MS
Bit 0:	Bit 0	Bit 8
Bit 1:	Bit 1	Bit 9
Bit 2:	Bit 2	Bit 10
Bit 3:	Bit 3	Bit 11
Bit 4:	Bit 4	Bit 12
Bit 5:	Bit 5	Bit 13
Bit 6:	Bit 6	Bit 14
Bit 7:	Bit 7	Bit 15

Desired Baud Rate	Divisor Used to Generate 16x Clock
300	384
600	192
1200	96
1800	64
2400	48
3600	32
4800	24
9600	12
14400	8
19200	6
28800	4
38400	3
57600	2
115200	1

7. Appendix

7.1 Dimension